

*Geometry CP*  
*Chapter 3 Notes*  
***Parallel and Perpendicular Lines***  
***And***  
***Coordinate Geometry***

*Hunt/Scully*

Name \_\_\_\_\_

Name \_\_\_\_\_

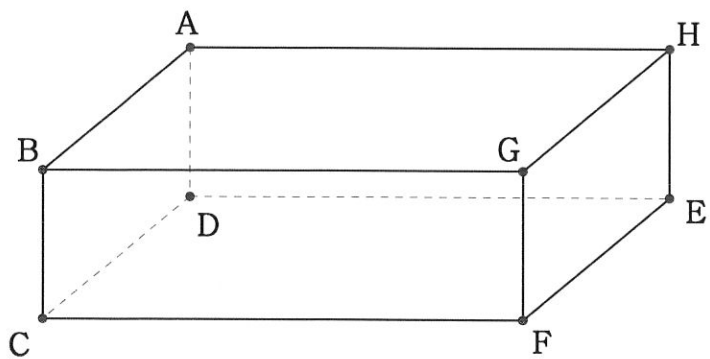
Date \_\_\_\_\_

3.1 NOTES – Lines and Angles (p. 146-151)

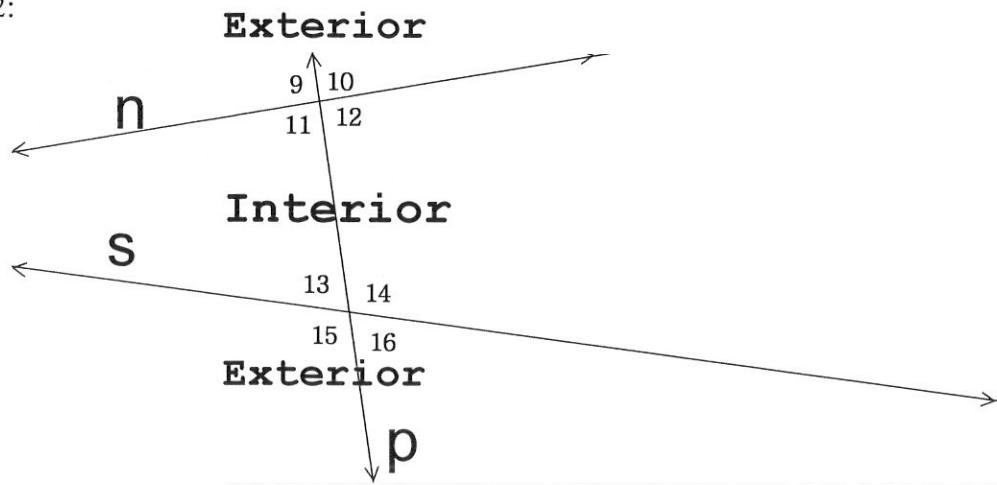
A. Types of Lines

	Symbol	Description	Examples from Picture 1
Perpendicular Lines			
Parallel Lines			
Skew Lines			

Picture # 1:



Picture # 2:



## B. Identifying Angles Formed by Transversals

Transversal –

Which line in the picture below is the transversal? Why?

TYPE OF ANGLES	DESCRIPTION/DEFINITION	EXAMPLES FROM PICTURE # 2
Interior Angles		
Exterior Angles		
Corresponding Angles		
Alternate Exterior Angles		
Alternate Interior Angles		
Same Side Interior Angles or Consecutive Interior Angles		
Same Side Exterior Angles or Consecutive Exterior Angles		

Example: Use the diagram below to answer each question.

Name all the interior angles.

Name all the exterior angles.

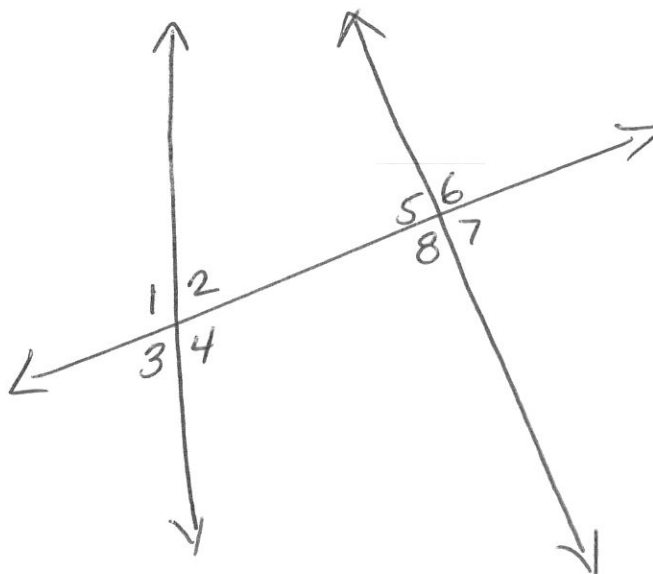
Name four pairs of corresponding angles.

Name two pairs of alternate interior angles.

Name two pairs of alternate exterior angles.

Name two pairs of same side interior angles.

Name two pairs of same side exterior angles.



Name: \_\_\_\_\_

Date: \_\_\_\_\_

### SECTION 3.2 -- PROPERTIES OF PARALLEL LINES

*p. 155 - 161*

#### **Corresponding Angles Postulate**

If two lines are PARALLEL, then corresponding angles are \_\_\_\_\_.

EX:

#### **Alternate Interior Angles Theorem**

If two lines are PARALLEL, then alternate interior angles are \_\_\_\_\_.

EX:

#### **Alternate Exterior Angles Theorem**

If two lines are PARALLEL, then alternate exterior angles are \_\_\_\_\_.

EX:

#### **Same-Side Interior Angles Theorem**

If two lines are PARALLEL, then same-side interior angles are \_\_\_\_\_.

EX:

#### **Same-Side Exterior Angles Theorem**

If two lines are PARALLEL, then same-side exterior angles are \_\_\_\_\_.

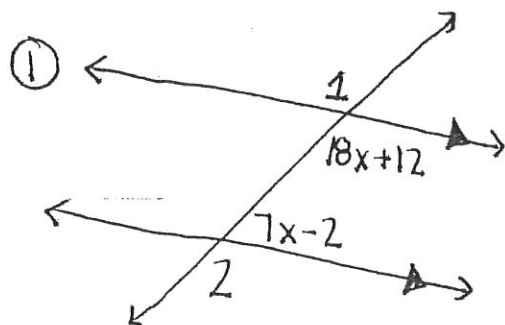
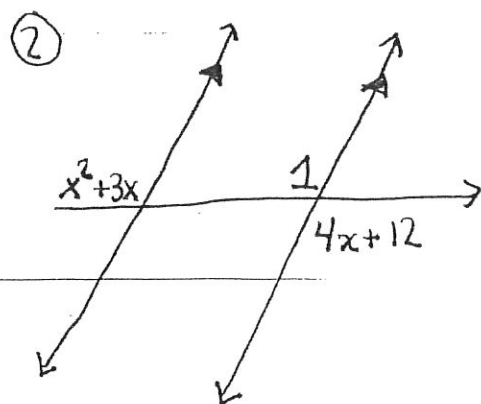
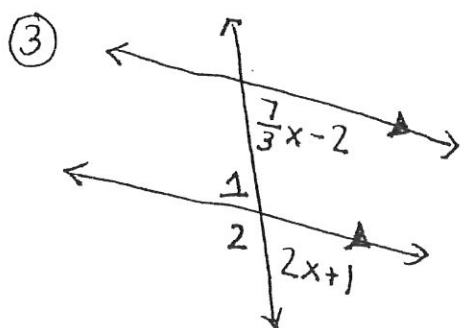
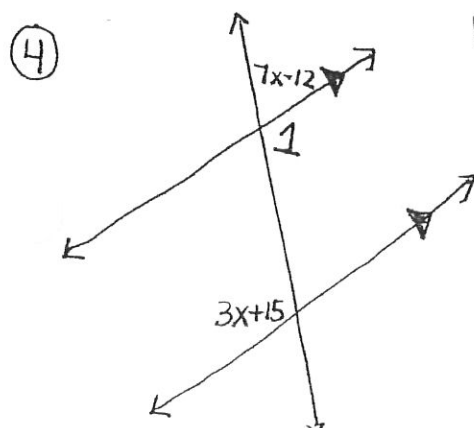
EX:

NAME: \_\_\_\_\_

DATE: \_\_\_\_\_

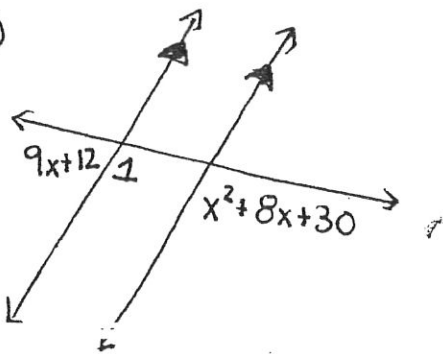
PRACTICE W/ PARALLEL LINES

For each problem below, set-up the correct equation, find  $x$ , and then find the measures of the appropriate  $\angle$ s.

Find  $m\angle 1$  and  $m\angle 2$ .Find  $m\angle 1$ .Find  $m\angle 1$  and  $m\angle 2$ .Find  $m\angle 1$ .

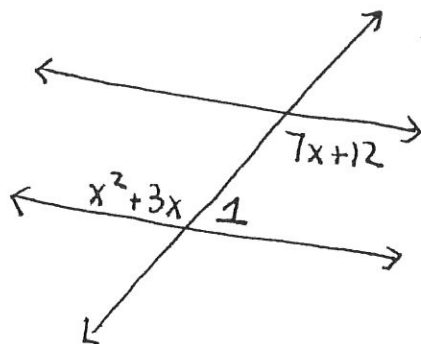
⑤

Find  $m\angle 1$ .



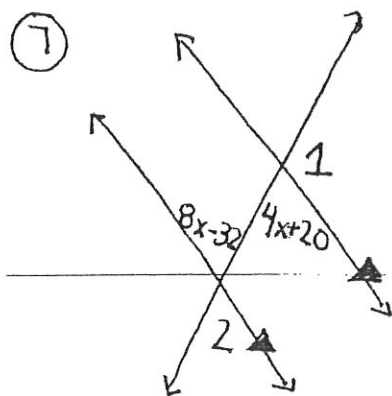
⑥

Find  $m\angle 1$ .



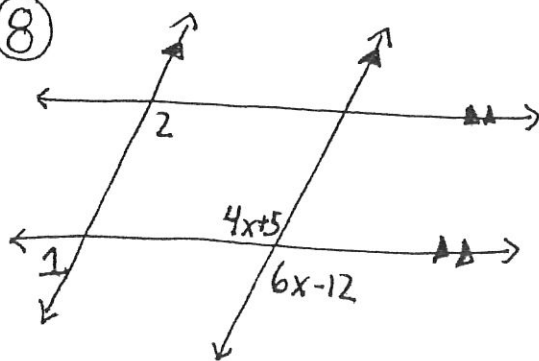
⑦

Find  $m\angle 1$  and  $m\angle 2$ .



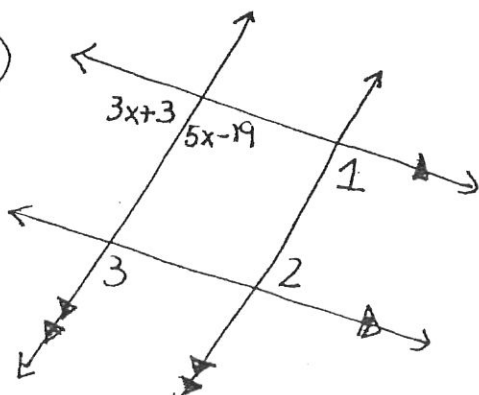
⑧

Find  $m\angle 1$  and  $m\angle 2$ .



⑨

Find  $m\angle 1$ ,  $m\angle 2$ , and  $m\angle 3$ .



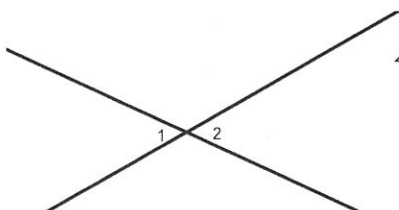
Name: \_\_\_\_\_

Date: \_\_\_\_\_

# **PARALLEL and PERPENDICULAR POSTULATES and THEOREMS** Sections 3.1 and 3.2

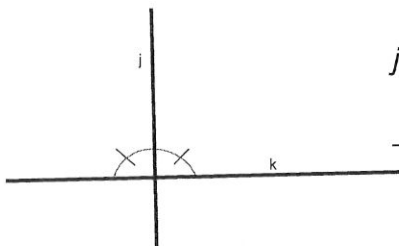
**DIRECTIONS:** Looking at the picture, complete each statement with a rule that we have learned.

1.



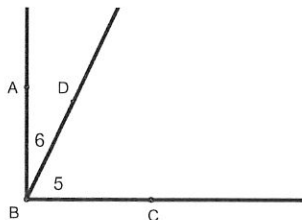
$\angle 1 \cong \angle 2$  because \_\_\_\_\_.

2.



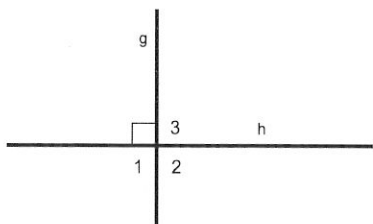
$j \perp k$  because \_\_\_\_\_.

3.



If  $m\angle 5 + m\angle 6 = 90^\circ$ , then  $\overrightarrow{BA} \perp \overrightarrow{BC}$  because \_\_\_\_\_.

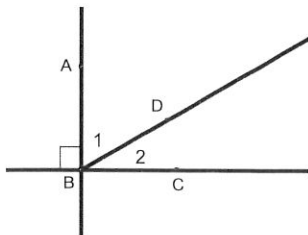
4.



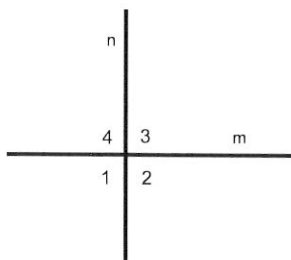
If  $g \perp h$ , then  $\angle 1$ ,  $\angle 2$ , and  $\angle 3$  are right angles because \_\_\_\_\_.

**DIRECTIONS:** Use the given information and your rules about perpendicular lines. What can you conclude about  $\angle 1$ ,  $\angle 2$ ,  $\angle 3$ , and/or  $\angle 4$ ?

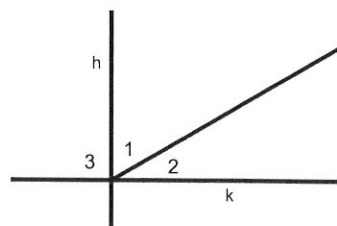
5.  $\overline{AB} \perp \overline{CB}$



6.  $n \perp m$

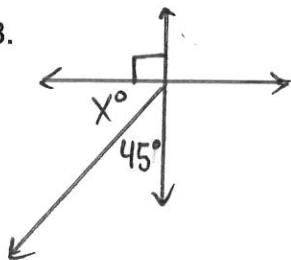


7.  $h \perp k$

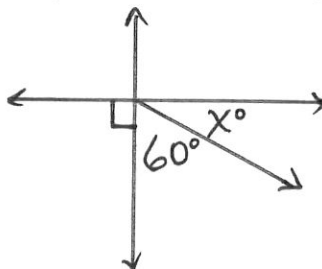


**DIRECTIONS:** Find the value of  $x$ . Show your work!

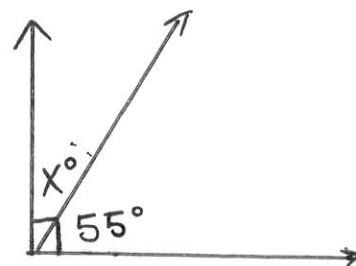
8.



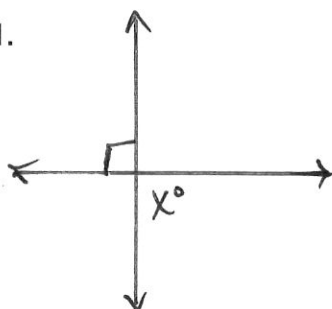
9.



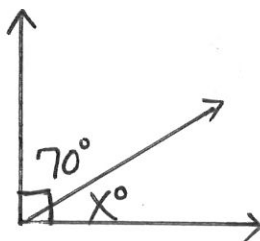
10.



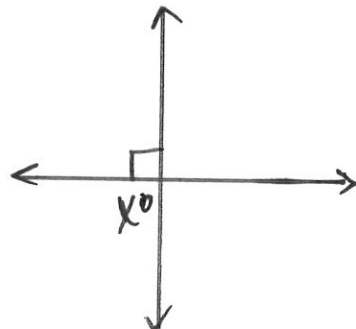
11.



12.



13.

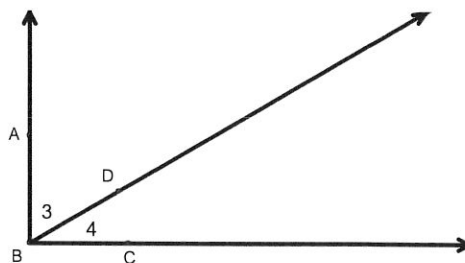


**DIRECTIONS:** Fill in the blanks to complete this proof.

14.

GIVEN:  $\overrightarrow{BA} \perp \overrightarrow{BC}$

PROVE:  $\angle 3$  is complementary to  $\angle 4$



We are given that  $\overrightarrow{BA} \perp \overrightarrow{BC}$ .  $\angle ABC$  is a right angle because \_\_\_\_\_.

Therefore,  $m\angle ABC = \underline{\hspace{2cm}}^\circ$ , since \_\_\_\_\_. By the \_\_\_\_\_ Addition

Postulate,  $m\angle 3 + m\angle 4 = m\angle \underline{\hspace{2cm}}$ . By \_\_\_\_\_,  $m\angle 3 + m\angle 4 = 90^\circ$ . We now know

that  $\angle 3$  is complementary to  $\angle 4$  because \_\_\_\_\_.



Name: \_\_\_\_\_

Date: \_\_\_\_\_

### SECTIONS 3.3 -- PROVING that 2 Lines are PARALLEL

*p. 162 – 169*

#### **Corresponding Angles Converse**

If corresponding angles are \_\_\_\_\_, then two lines are parallel.

EX:

#### **Alternate Interior Angles Converse**

If alternate interior angles are \_\_\_\_\_, then two lines are parallel.

EX:

#### **Alternate Exterior Angles Converse**

If alternate exterior angles are \_\_\_\_\_, then two lines are parallel.

EX:

#### **Same-Side Interior Angles Converse**

If same-side interior angles are \_\_\_\_\_, then two lines are parallel.

EX:

#### **Same-Side Exterior Angles Converse**

If same-side exterior angles are \_\_\_\_\_, then two lines are parallel.

EX:

**THEOREM:** If two lines are parallel to the same line, then \_\_\_\_\_.

EX:

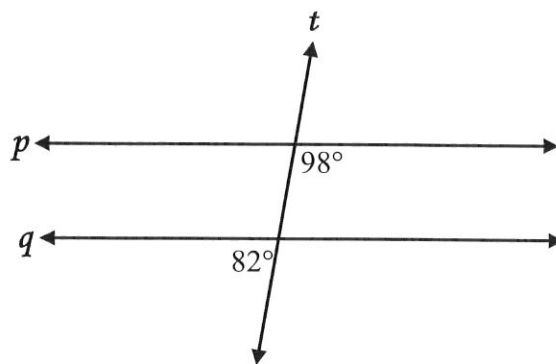
**THEOREM:** In a plane, if two lines are perpendicular to the same line, then \_\_\_\_\_.

EX:

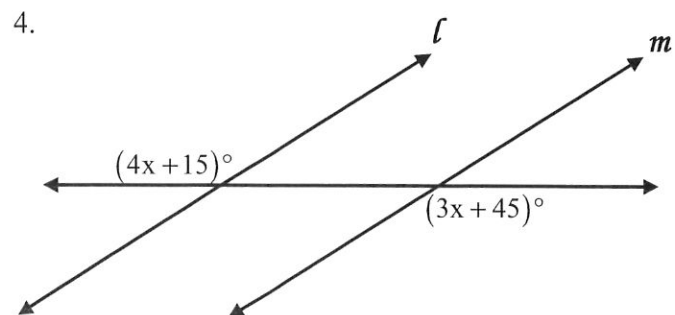
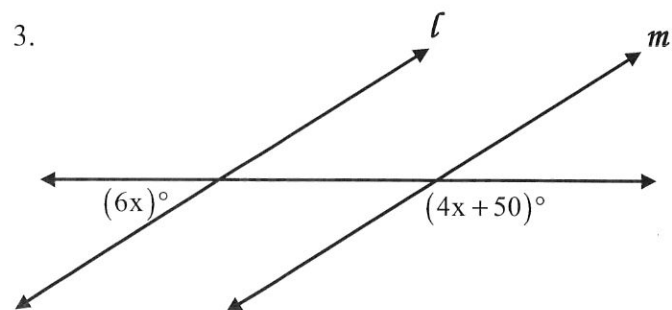
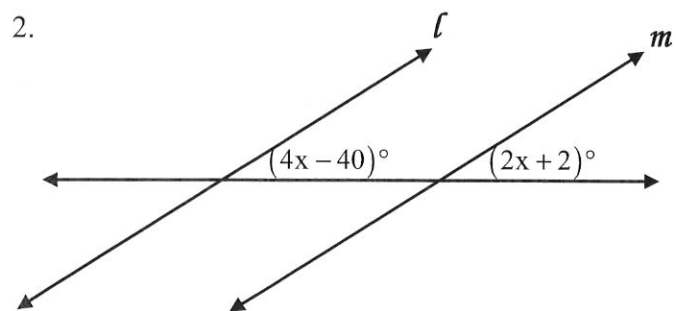
A-Geometry  
Worksheet 3.5B

Name \_\_\_\_\_

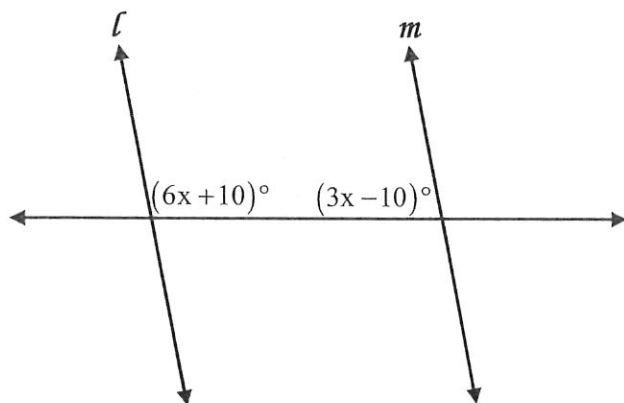
1. Are lines  $p$  and  $q$  parallel? Explain.



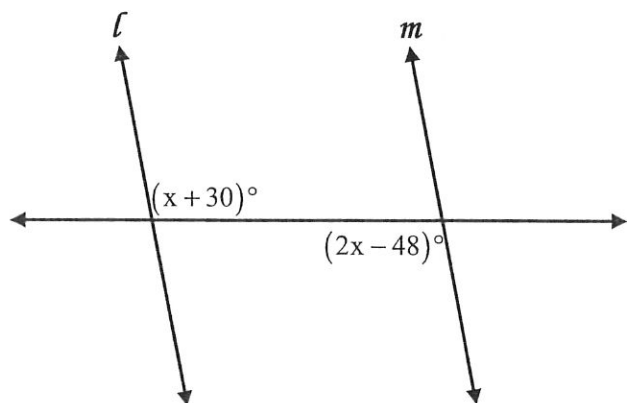
For #2-6, find the value of  $x$  so that  $\ell$  and  $m$  are parallel.



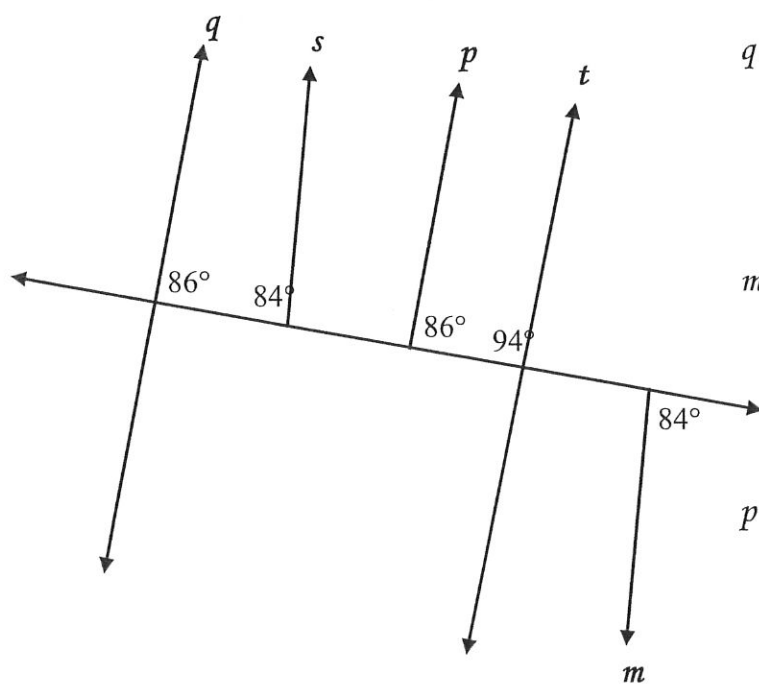
5.



6.



7. Determine the reason that each pair of lines ARE parallel.



$q$  and  $t$  \_\_\_\_\_

\_\_\_\_\_

$m$  and  $s$  \_\_\_\_\_

\_\_\_\_\_

$p$  and  $q$  \_\_\_\_\_

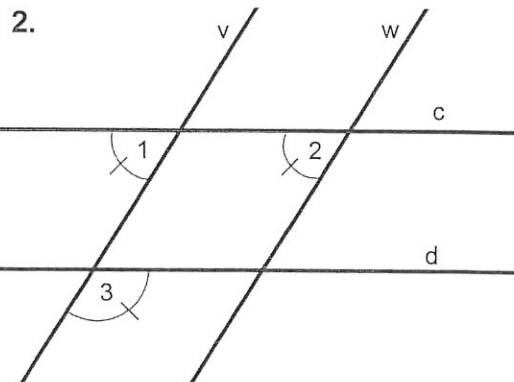
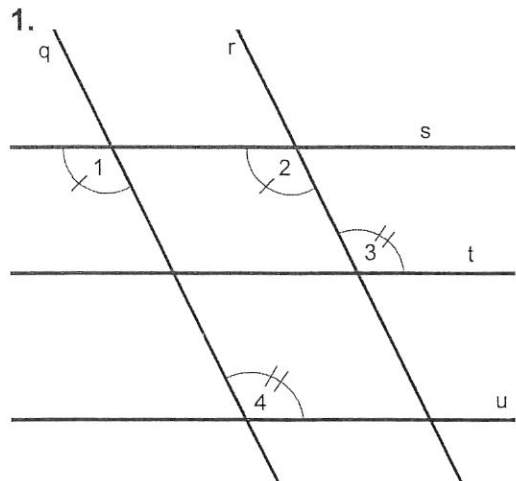
\_\_\_\_\_

Name: \_\_\_\_\_

Date: \_\_\_\_\_

### PROVING LINES ARE PARALLEL -- PROOFS

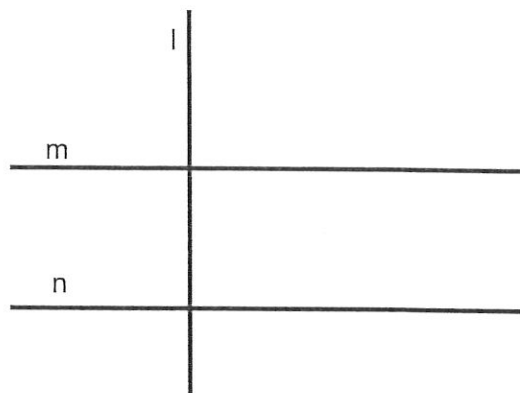
Determine which lines in the picture are parallel. State why they are parallel (be specific).



Write a proof.

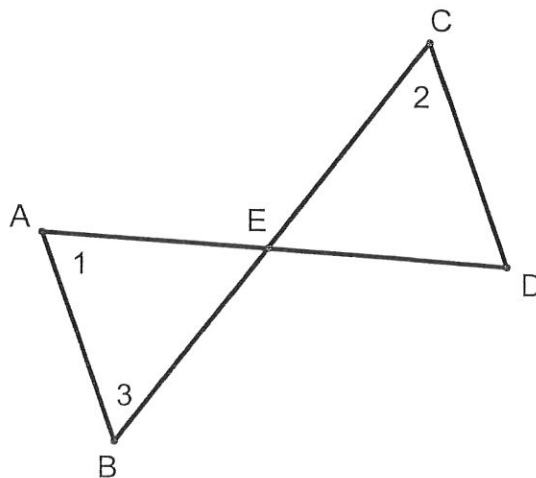
3. GIVEN:  $m \perp l$   
 $n \perp l$

PROVE:  $m \parallel n$



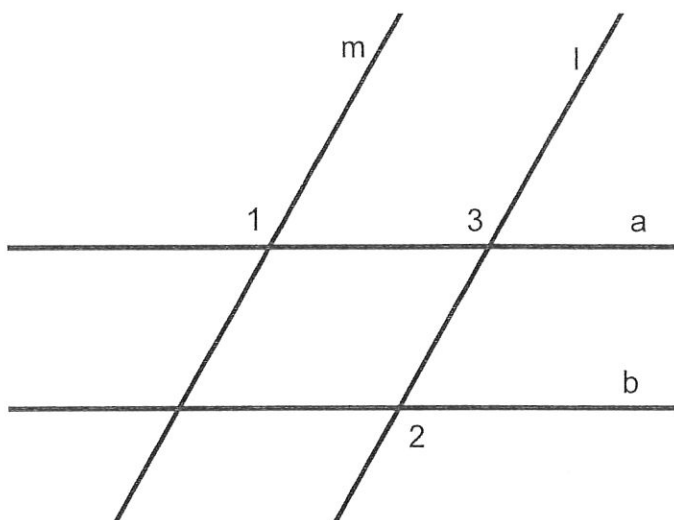
4. GIVEN:  $\angle 1 \cong \angle 2$   
 $\angle 1 \cong \angle 3$

PROVE:  $\overline{AB} \parallel \overline{CD}$



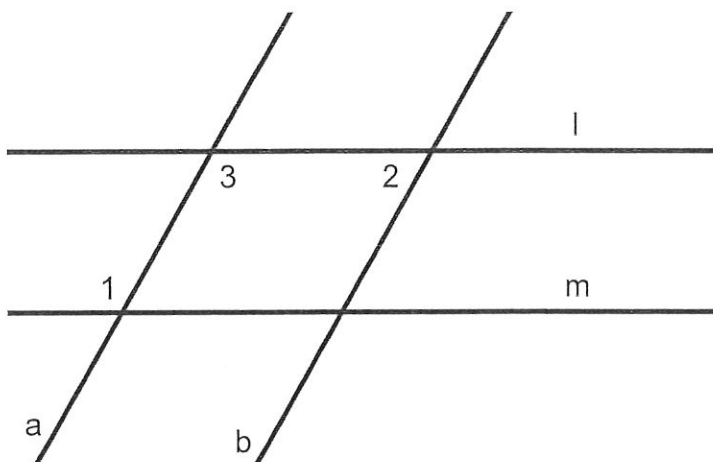
5. GIVEN:  $l \parallel m$   
 $\angle 1 \cong \angle 2$

PROVE:  $a \parallel b$



6. GIVEN:  $l \parallel m$   
 $\angle 1$  and  $\angle 2$  are supplementary

PROVE:  $a \parallel b$



Name: \_\_\_\_\_

Date: \_\_\_\_\_

### SECTION 3.4 – THEOREMS ABOUT PERPENDICULAR LINES

*p. 172 - 178*

#### PERPENDICULAR BISECTOR of a segment →

A line, ray, or segment that is \_\_\_\_\_ to the segment at its \_\_\_\_\_.

**EX:**

**THEOREM:** If two lines intersect to form a linear pair of congruent angles, then the lines are

\_\_\_\_\_.

**THEOREM:** In a plane, if a transversal is perpendicular to one of two parallel lines, then it is

\_\_\_\_\_ to the other line.

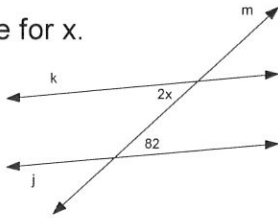
**THEOREM:** If two sides of two adjacent, acute angles are perpendicular, then the angles are

\_\_\_\_\_.

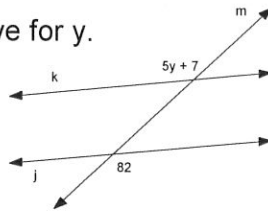
# PRACTICE PROBLEMS

In each of the following problems, assume that  $k \parallel j$ .

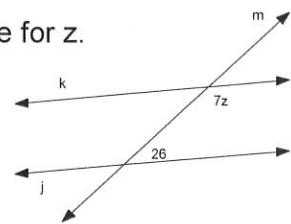
1. Solve for  $x$ .



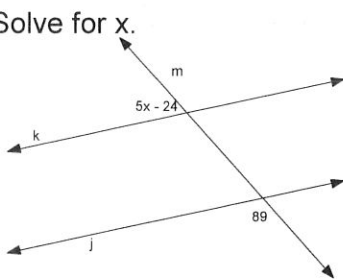
2. Solve for  $y$ .



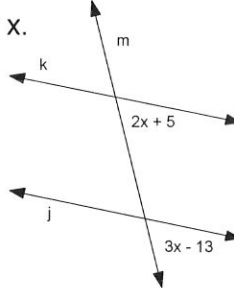
3. Solve for  $z$ .



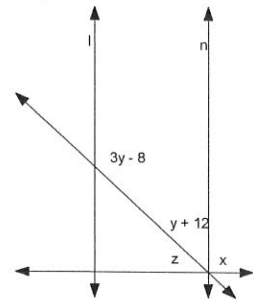
4. Solve for  $x$ .



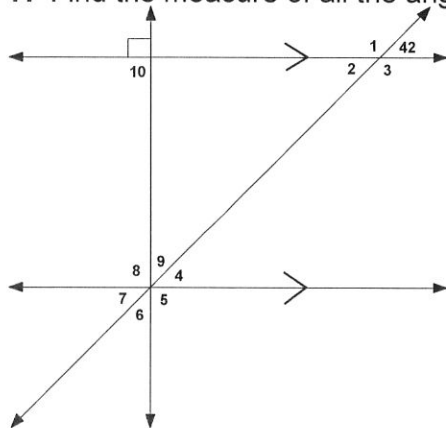
5. Solve for  $x$ .



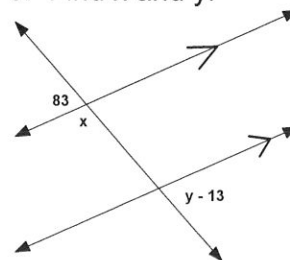
6.  $l \parallel n$  and  $m \perp n$ .  
Solve for  $x$ ,  $y$ , and  $z$ .



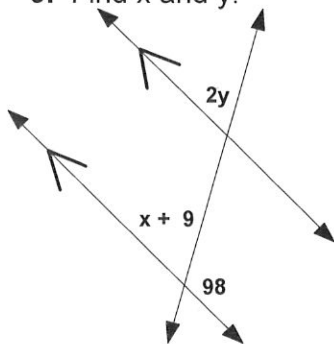
7. Find the measure of all the angles in the diagram.



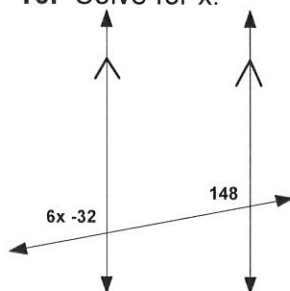
8. Find  $x$  and  $y$ .



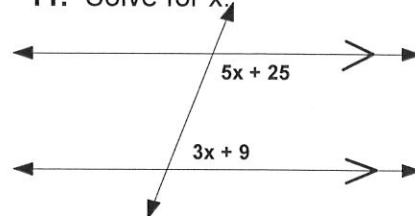
9. Find  $x$  and  $y$ .



10. Solve for  $x$ .



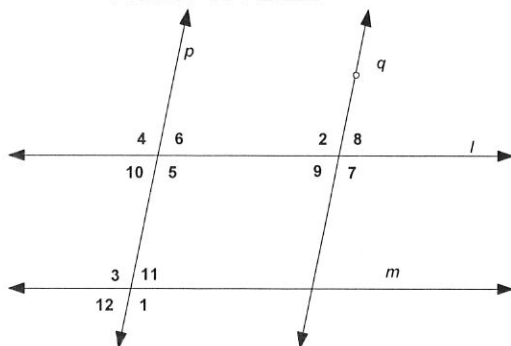
11. Solve for  $x$ .



12. WRITE A PROOF:

Given:  $l \parallel m$  and  $p \parallel q$

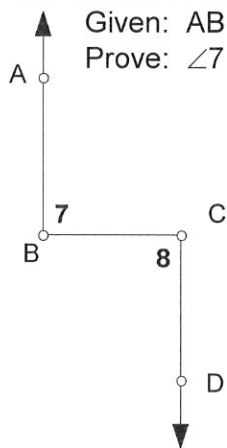
Prove:  $\angle 1 \cong \angle 2$



13. WRITE A PROOF:

Given:  $AB \perp BC$  and  $BC \perp CD$

Prove:  $\angle 7 \cong \angle 8$





Proofs: Chap 3

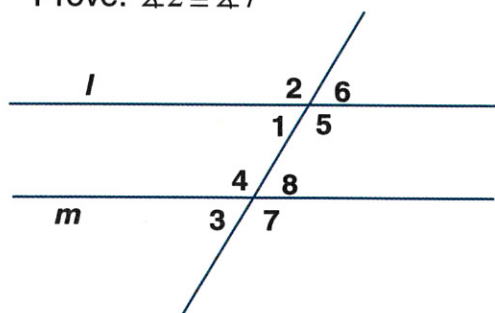
Write a proof for each problem.

Name \_\_\_\_\_

Date \_\_\_\_\_

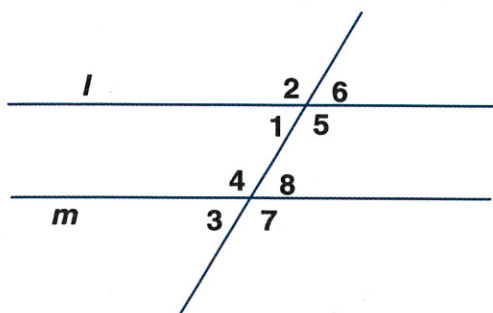
1. Given:  $l \parallel m$

Prove:  $\angle 2 \cong \angle 7$



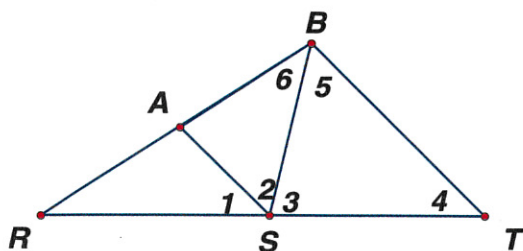
2. Given:  $l \parallel m$

Prove:  $\angle 1$  is supplementary to  $\angle 7$



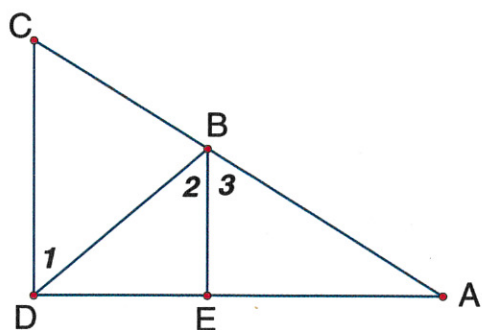
3. Given:  $\overline{AS} \parallel \overline{BT}$ ;  $m\angle 4 = m\angle 5$

Prove:  $\overline{SA}$  bisects  $\angle BSR$



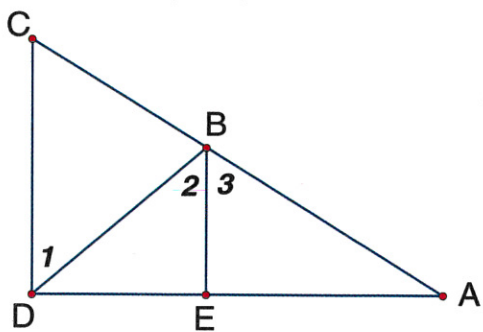
4. Given:  $\overline{BE}$  bisects  $\angle DBA$ ;  $\angle 3 \cong \angle 1$

Prove:  $\overline{CD} \parallel \overline{BE}$



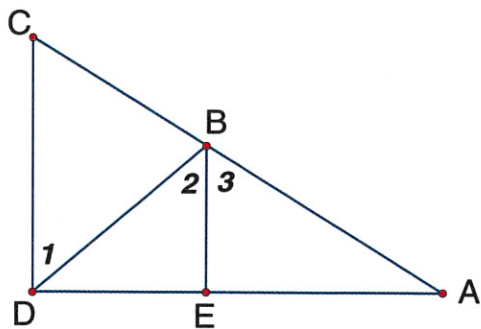
5. Given:  $\overline{BE} \perp \overline{DA}$ ;  $\overline{CD} \perp \overline{DA}$

Prove:  $\angle 1 \cong \angle 2$



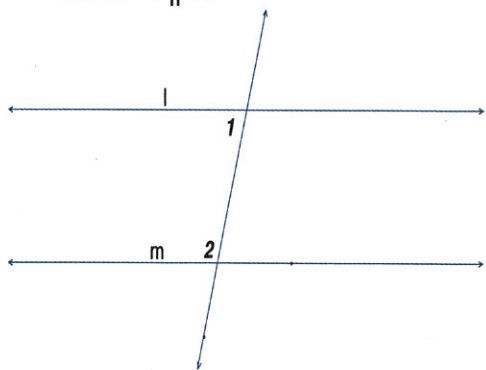
6. Given:  $\angle C \cong \angle 3$ ;  $\overline{BE} \perp \overline{DA}$

Prove:  $\overline{CD} \perp \overline{DA}$



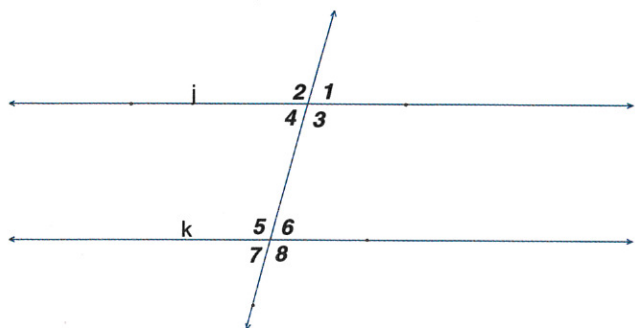
7. Given:  $m\angle 1 = 35^\circ$ ;  $m\angle 2 = 145^\circ$

Prove:  $l \parallel m$



8. Given:  $j \parallel k$ ;  $m\angle 1 = 50^\circ$

Prove:  $m\angle 5 = 130^\circ$



Name: \_\_\_\_\_

Date: \_\_\_\_\_

## CHAPTER 3 REVIEW

### Terminology, Rules, and Other Things You Should Know

Parallel Lines

Perpendicular Lines

Skew Lines

Alternate Interior  $\angle$ s

Alternate Exterior  $\angle$ s

Corresponding  $\angle$ s

Same-Side Interior  $\angle$ s

Same-Side Exterior  $\angle$ s

Transversal

5 Rules if Lines are  $\parallel$

How to write a proof:

7 Ways to Prove lines are  $\parallel$

1) Prove  $\angle$ s are supplementary or congruent

2) Prove that lines are  $\parallel$

3 Perpendicular Line Rules

You should still know EVERYTHING from Chapter 1 and 2!

### Format of the Test

PART 1  $\rightarrow$  Worth a total of 60 points

30 Questions

12 Multiple Choice (2 pts. each)

8 Problems Looking @ Pictures and Identifying Lines/Planes

6 Math Problems involving finding the value of  $x$

4 Problems Deciding if 2 Lines are  $\parallel \rightarrow$  Giving the reason why/why not

PART 2  $\rightarrow$  Worth a total of 35 points

10 Questions

4 Multiple Choice (2 pts. each)

3 Math Problems involving finding the value of  $x$  and measure of an angle

3 Proofs

**PRACTICE PROBLEMS**  $\rightarrow$  The best problems that I can find are the ones that we've already done. If you're planning on studying (which I hope you are), redo the following worksheets:

Homework Worksheets on finding  $x$  or finding the angles

Proof Worksheet

1. What type of angles are  $\angle 1$  and  $\angle 2$ ?
2. What type of angles are  $\angle 1$  and  $\angle 3$ ?
3. What type of angles are  $\angle 4$  and  $\angle 5$ ?
4. What type of angles are  $\angle 3$  and  $\angle 7$ ?
5. What type of angles are  $\angle 8$  and  $\angle 2$ ?

Assume that  $j \parallel k$  for the following problems.

6.  $m\angle 4 = 3x + 10$  and  $m\angle 6 = 5x - 30$ .

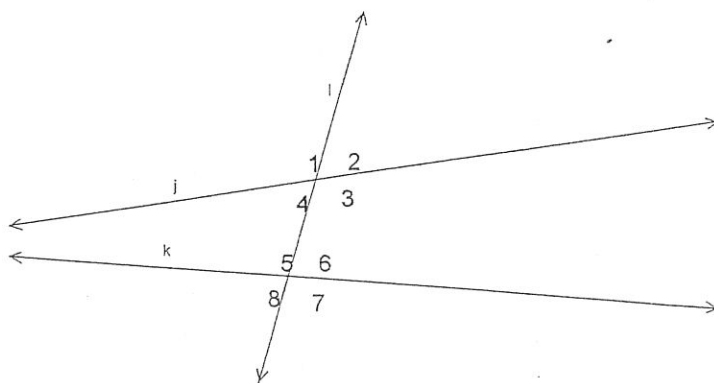
Find  $x$ . Find  $m\angle 7$ .

7.  $m\angle 1 = 4x + 10$  and  $m\angle 8 = 6x - 20$ .

Find  $x$ . Find  $m\angle 3$ .

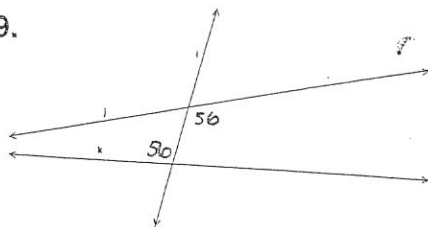
8.  $m\angle 5 = 5x - 12$  and  $m\angle 7 = 8x - 30$ .

Find  $x$ . Find  $m\angle 2$ .

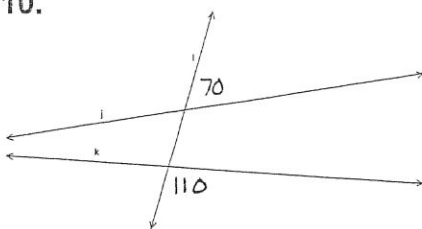


Are the lines below parallel? Why/why not?

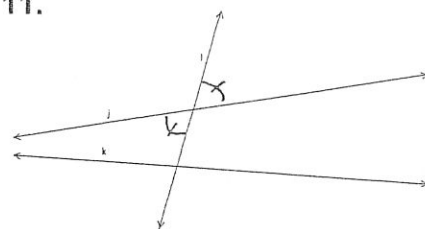
9.



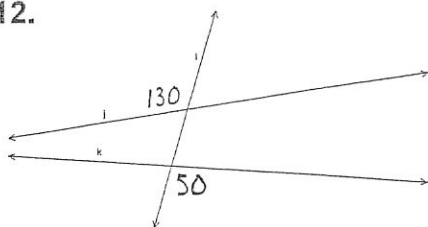
10.



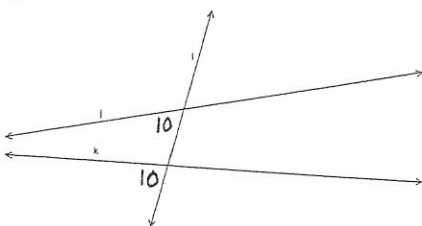
11.



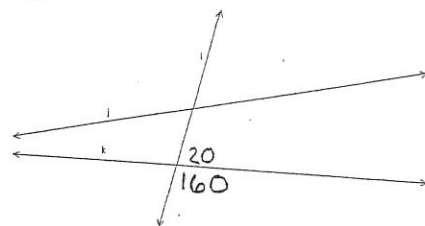
12.



13.



14.



Fill-in-the-blank with the term that makes the statement true (Parallel, Perpendicular, or Skew).

15.  $\overline{CG}$  and  $\overline{AG}$  are \_\_\_\_\_.

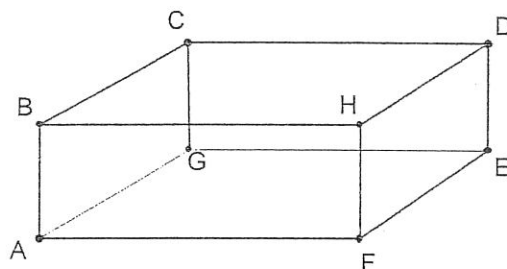
16.  $\overline{AF}$  and  $\overline{DE}$  are \_\_\_\_\_.

17.  $\overline{GE}$  and  $\overline{CD}$  are \_\_\_\_\_.

18.  $\overline{BC}$  and  $\overline{EF}$  are \_\_\_\_\_.

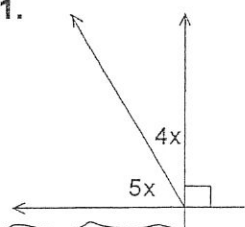
19.  $\overline{HF}$  and  $\overline{AG}$  are \_\_\_\_\_.

20.  $\triangle AFH$  and  $\triangle CHD$  are \_\_\_\_\_.

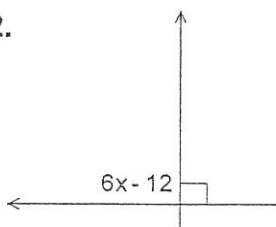


Solve for the variables.

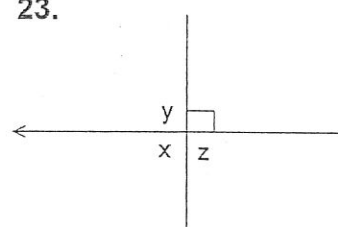
21.



22.



23.



ANSWERS:

1. Linear Pairs

5. Alternate Ext.  $\angle$ s

9. Yes - If alt. int.  $\angle$ s  $\cong$ , then  $\parallel$ .

13. Yes - If corresponding  $\angle$ s  $\cong$ , then  $\parallel$ .

17. Parallel

21.  $x = 10$

2. Vertical Angles

6.  $x = 20$   $m\angle 7 = 110^\circ$

10. Yes - If s. s. ext. supplementary, then  $\parallel$ .

14. No - Linear Pairs are always supplementary.

18. Parallel

22.  $x = 17$

3. Same-Side Int.  $\angle$ s

7.  $x = 19$   $m\angle 3 = 86^\circ$

11. No - Vertical angles are always  $\cong$ .

15. Perpendicular

19. Skew

23.  $x = y = z = 90$

4. Corresponding  $\angle$ s

8.  $x = 6$   $m\angle 2 = 162^\circ$

12. No - alternate exterior  $\angle$ s should be  $\cong$ .

16. Skew

20. Perpendicular